

# Using Total Lightning to Support the Aviation Weather Center

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# Outline

- Brief description of Lightning data and its use at the Aviation Weather Center (AWC)
  - Operational and experimental sources
- How we use lightning variables to support aviation forecasts
- How we can use lightning data to derive aviation variables to support operations
- Preparing for the GOES-16 GLM Era





# Aviation Weather Center Operations

- The Aviation Weather Center delivers consistent, timely and accurate weather information for the world airspace system. We are a team of highly skilled people dedicated to working with customers and partners to enhance safe and efficient flight
- Convective weather products include convective SIGMET (CONUS and Tropics) along with new TFM Convective Forecast to support NAS efficiency
- Other tools include subjective validation of current international convective forecasts



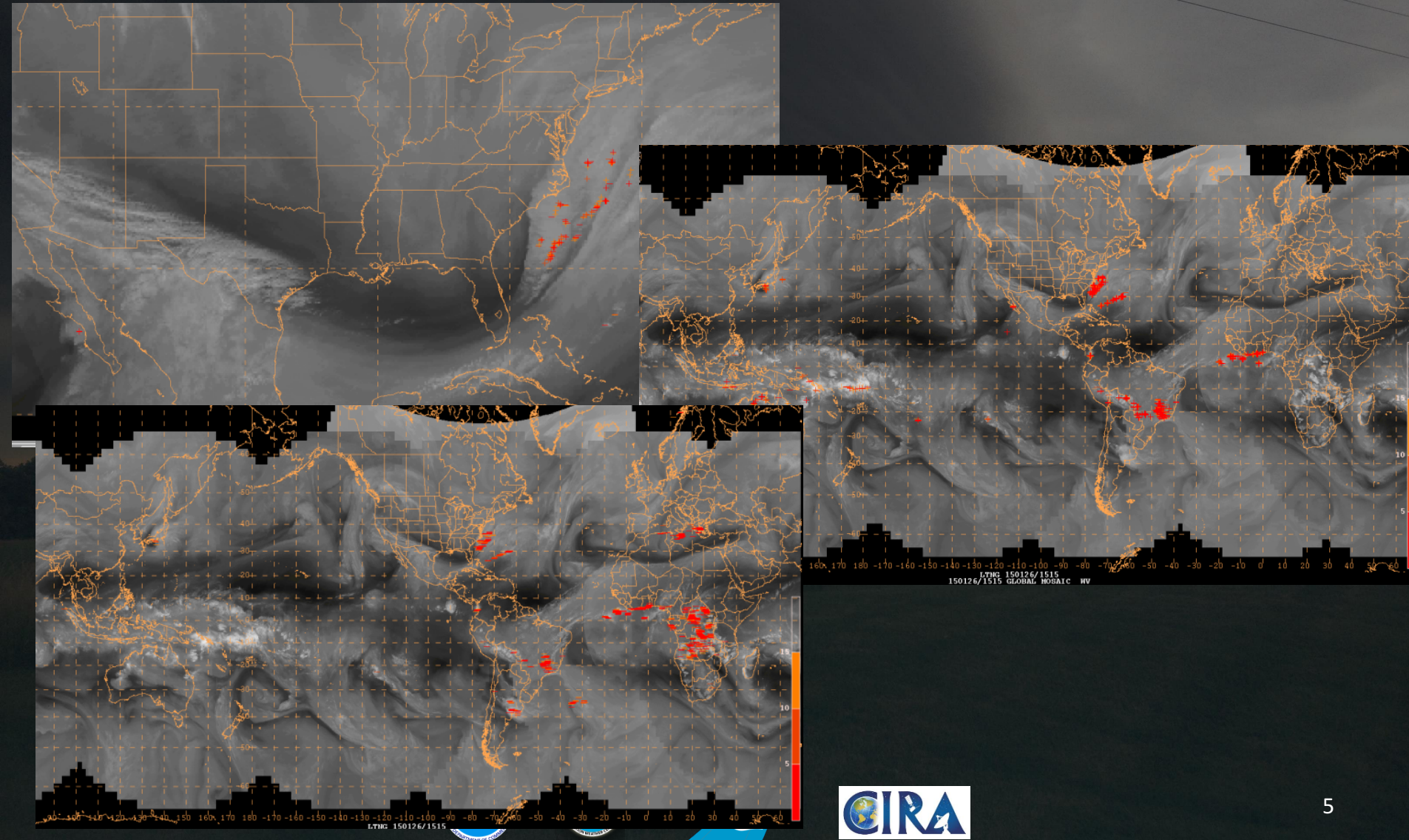
# Current Operational Sources of Lightning Data at AWC

- Provided by NOAA/NWS
  - Cloud-to-ground (CG) LTG Flash information
    - Ground based sensor network
  - Global Lightning Detection
    - Subset west of Prime Meridian / east of 110° E and north of 30° S / south of 90° N
    - Total lightning source data (Not grouped into flashes)
  - Global Sferics
    - Covers Africa and Europe and most of the Eastern Hemisphere



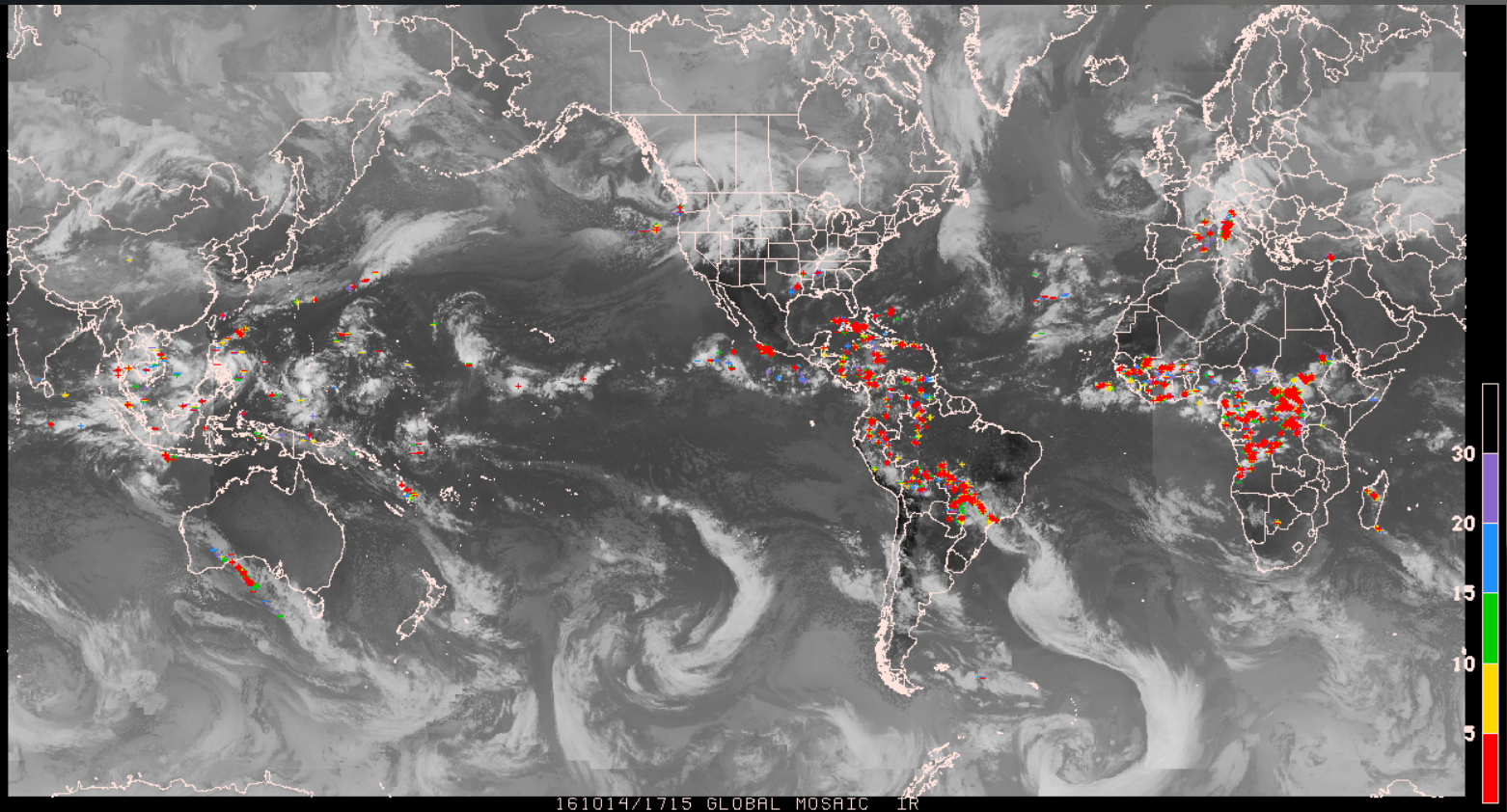


# Current Operational Use of Lightning Data at AWC





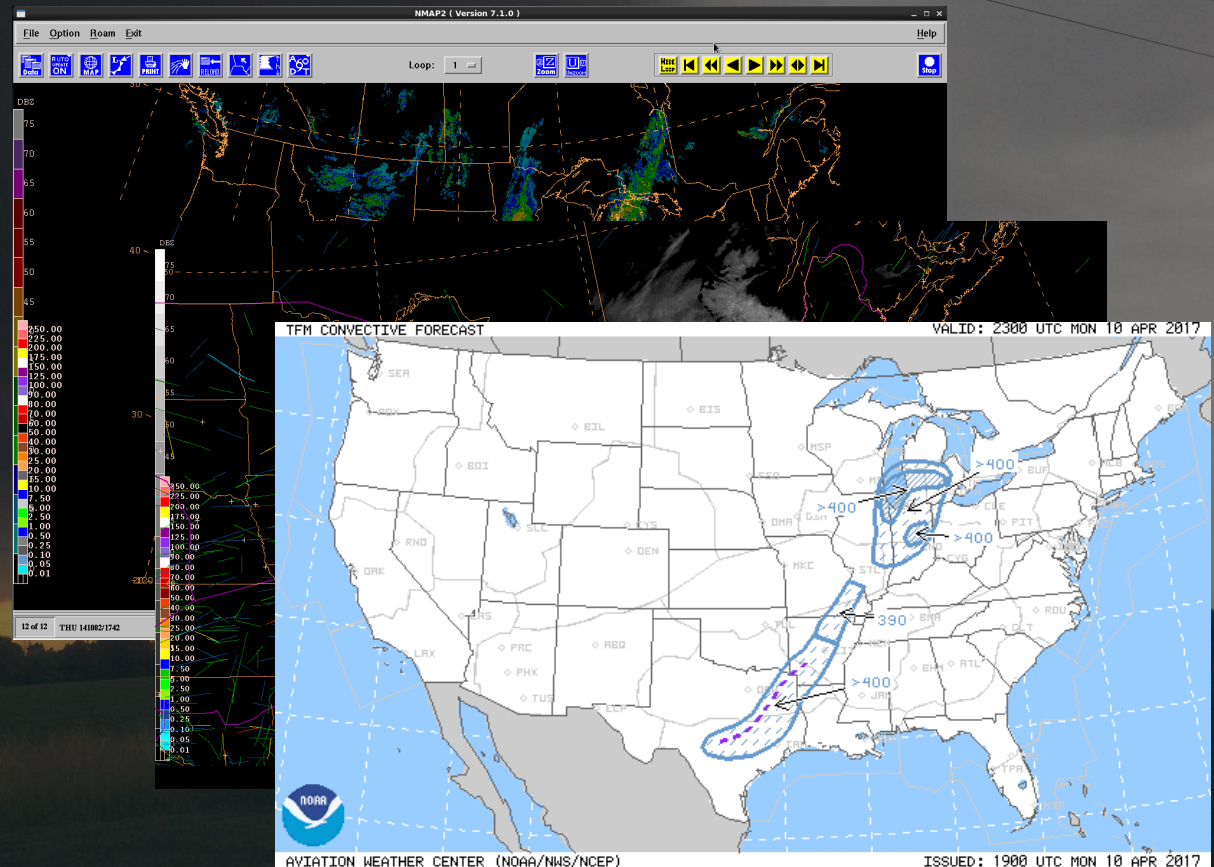
# Current Operational Use of Lightning Data at AWC



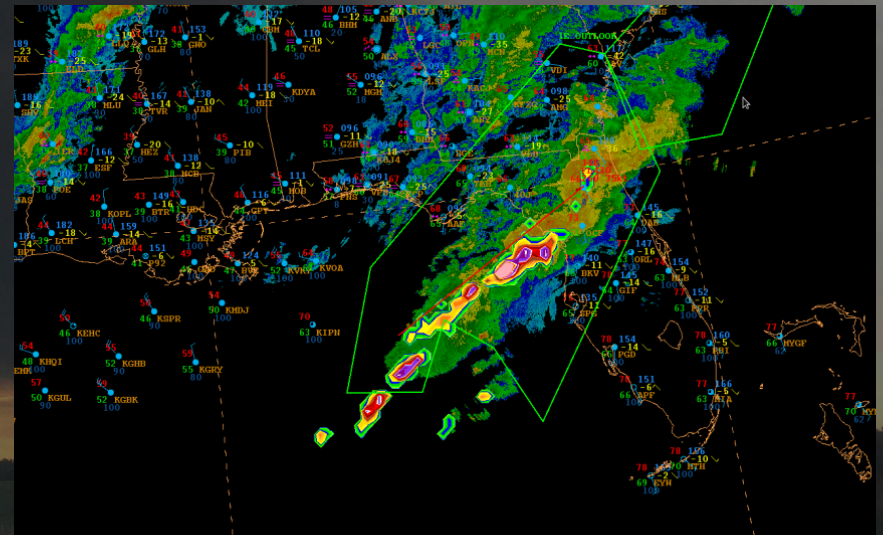
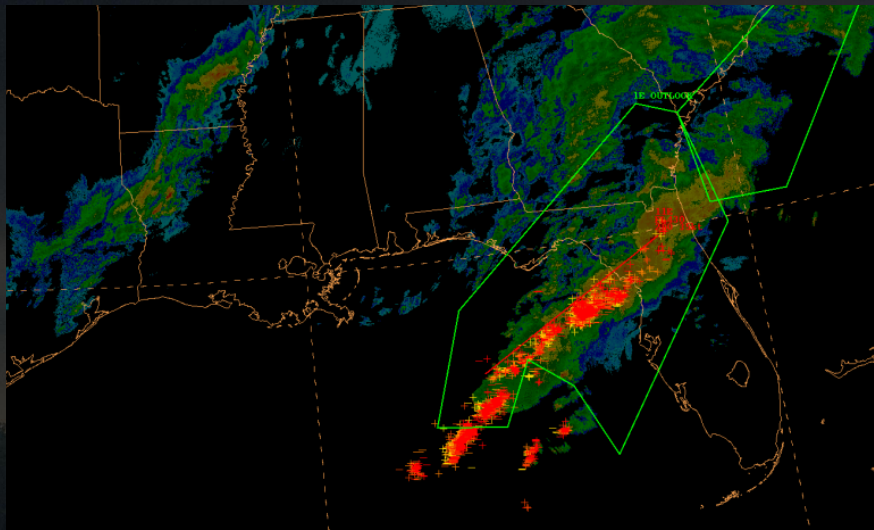


# Using Total Lightning Data to support Aviation

- Derived Lightning in operations
  - Total Lightning density
  - Sources per 13-km<sup>2</sup> grid box per 10-min. every 5 min.
  - Support SIGMET production in U.S. and Tropical (Gulf of Mexico and Caribbean)
  - Support TCF and IDSS



# Using Total Lightning Data to support Aviation

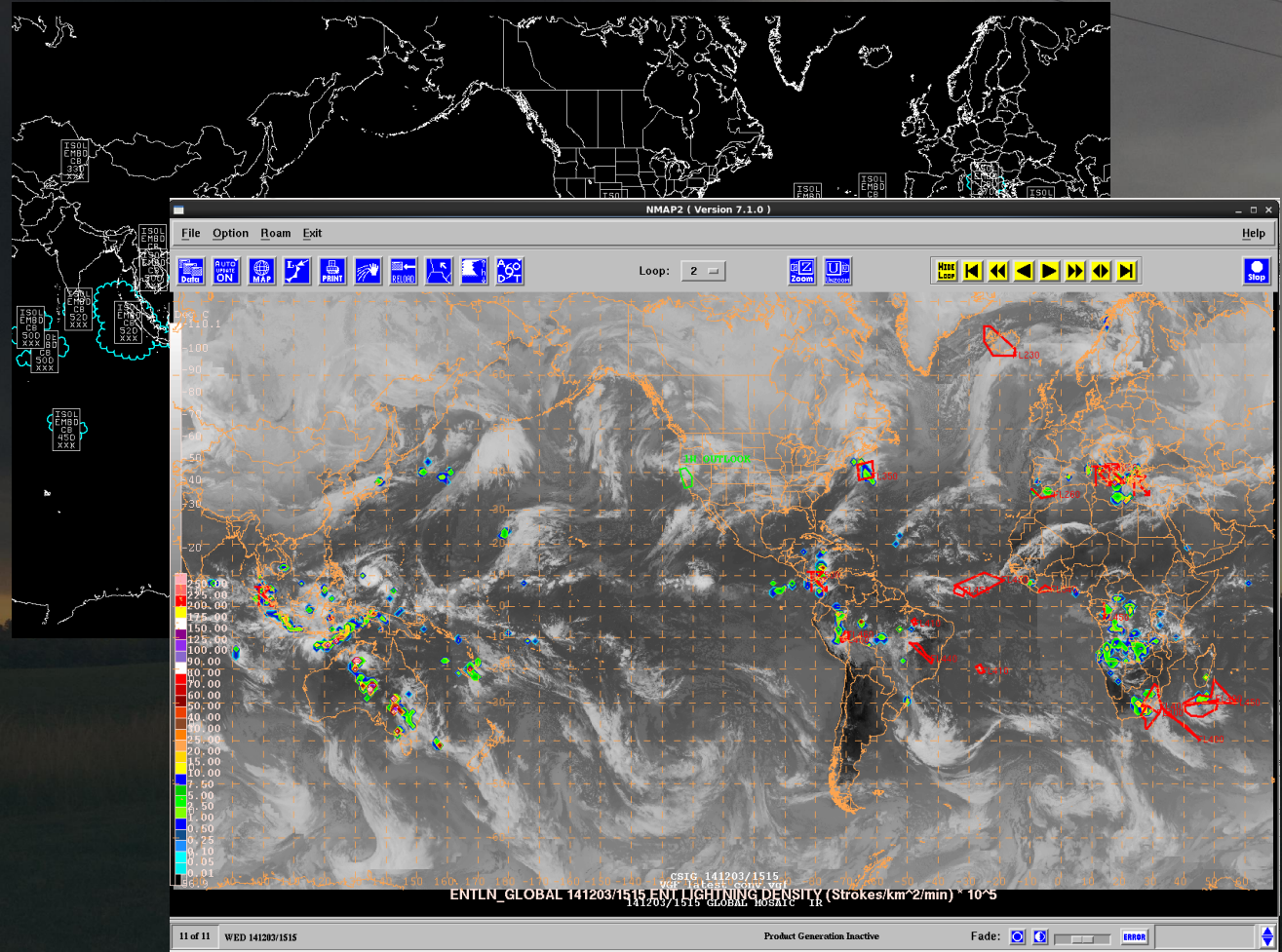


- Using gridded lightning density to support operations.



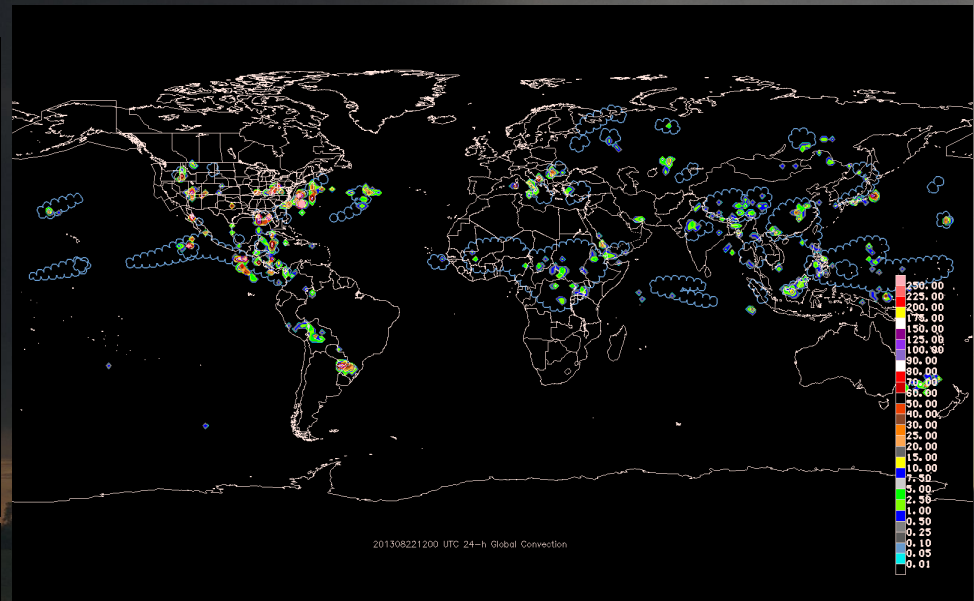
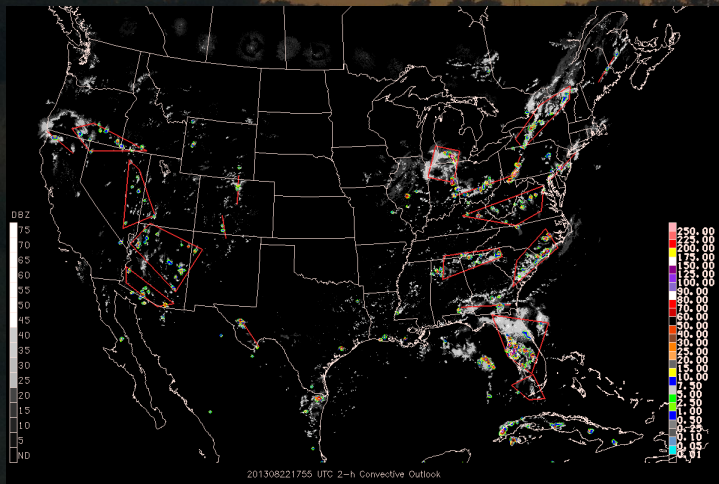
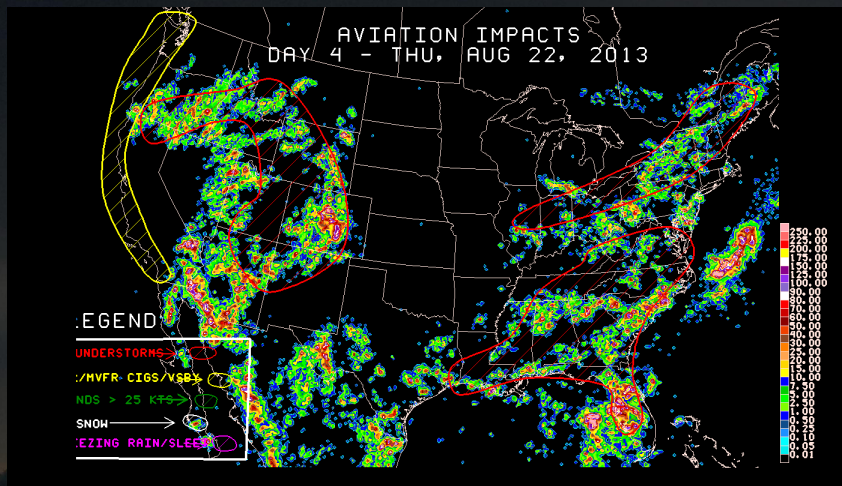
# Using Total Lightning Data to support Aviation

- International Support
  - Forecast validity
    - How well was the previous days forecast?



# Using Total Lightning Data to support Aviation

- Verification

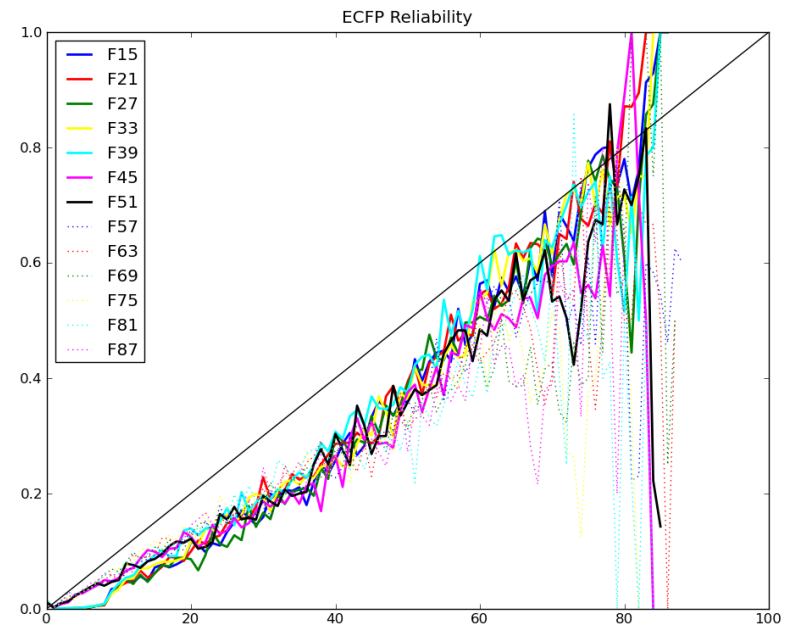
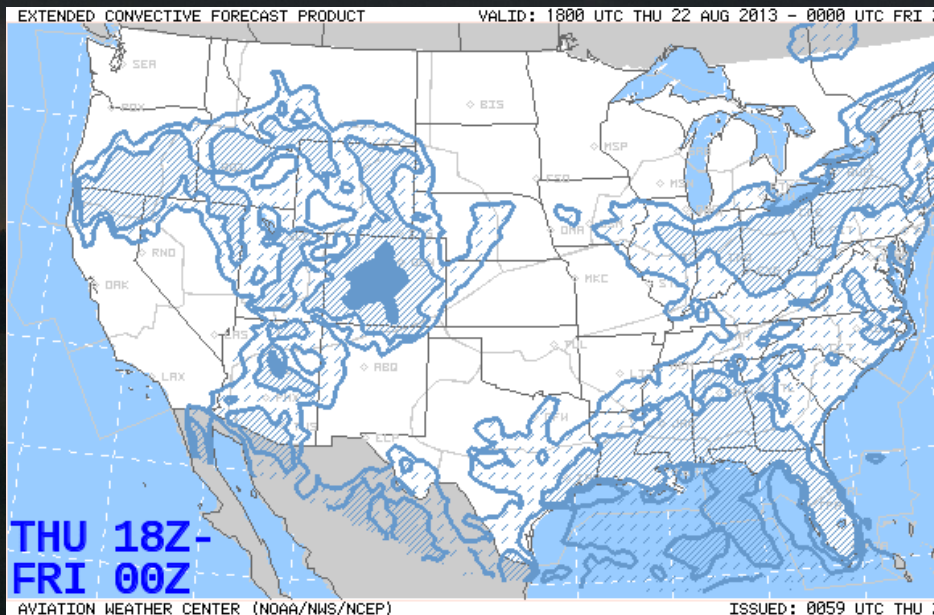


Sample products issued during the AWC Testbed Summer Experiment 2013. An official long range planning forecast for the FAA Command Center issued by the an AWC National Aviation Meteorologist overlaid is gridded lightning density showing how well the forecast turned out. Experimental 2-h Outlook from the Convective SIGMET desk with grayscaled composite reflectivity and gridded total lightning data. Sample global convective forecast with global gridded total lightning density



# Using Total Lightning Data to support Aviation

- Objective Verification
  - Reliability of Extended Convective Forecast Product
  - Total Lightning used as Truth



# Using Total Lightning Data to support Aviation

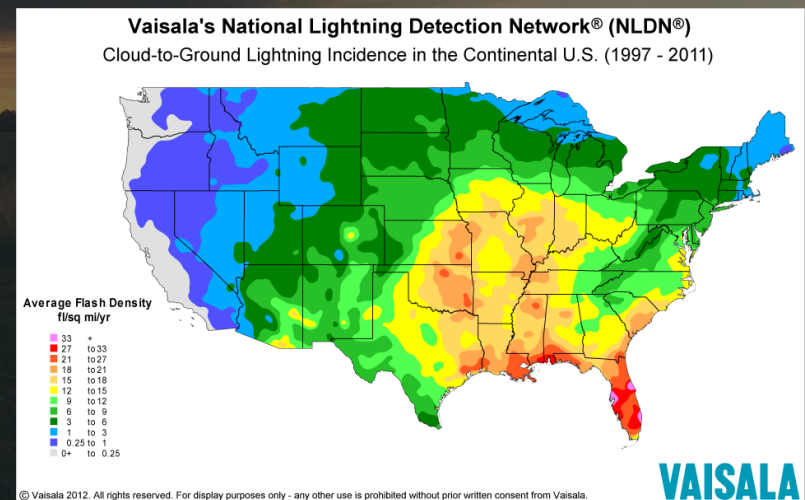
- Derived Gridded Products
  - Identify specific to aviation hazards to address
    - Convective SIGMET support
    - TFM Convective Forecast
      - IDSS
      - Pseudo radar fields
  - Benefits
    - Fills in spatial gaps
    - High temporal density provides greater decision support
    - Presence of lightning an indicator of where the convection really is





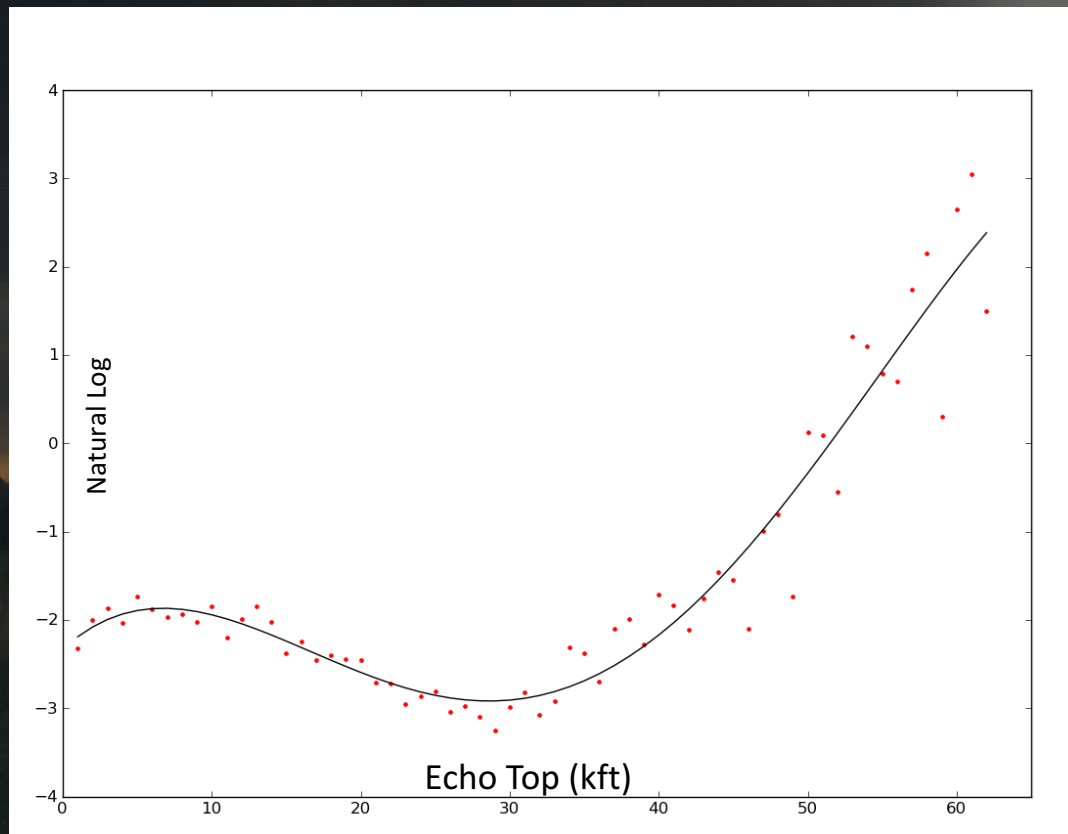
# Using Total Lightning Data to support Aviation

- Creating a pseudo radar field:
  - Identify relationship between lightning and MRMS echo-tops
  - For U.S., assume no latitudinal differences in lightning stroke rate



# Using Total Lightning Data to support Aviation

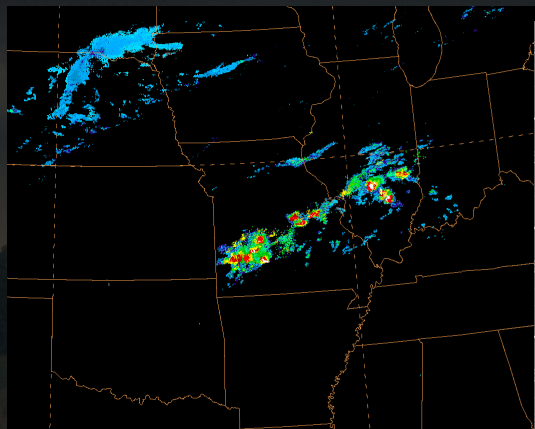
- Relationship:





# Using Total Lightning Data to support Aviation

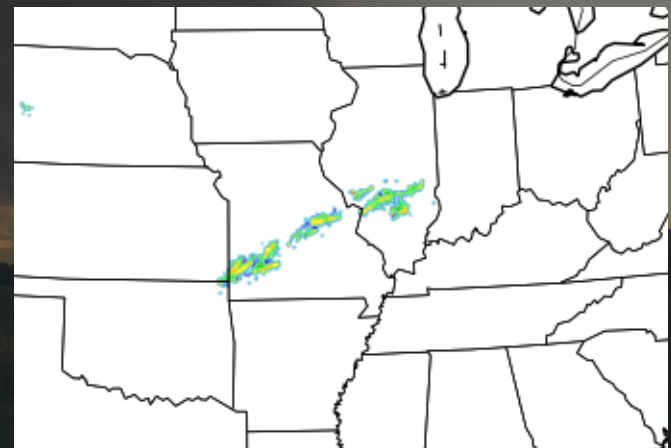
- Application
  - Graphically on the web, or encoded in WMO GRIB2 format



\*Radar observed echo-top



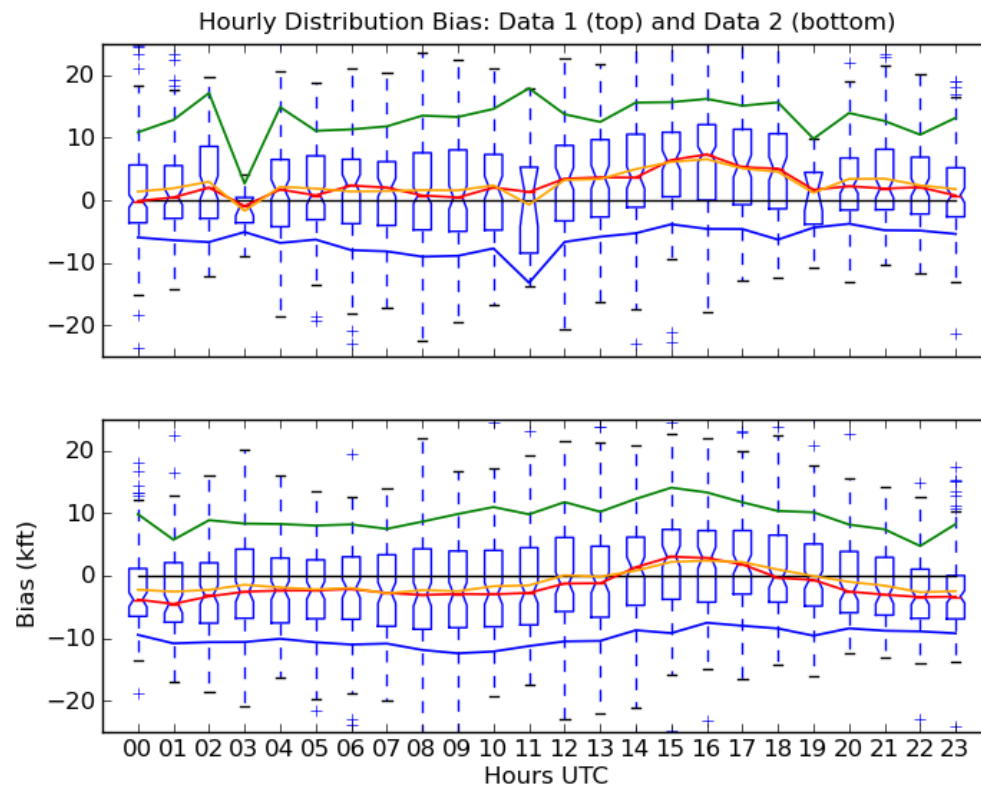
\*Lightning derived echo-top  
forecaster display



\*Lightning derived echo-top  
dataset web display

# Using Total Lightning Data to support Aviation

- Verification





# Using Total Lightning Data to support Aviation

- Prepping for GLM
  - Evaluation?
  - Forecaster education
  - How to use in NMAP
    - Gridded data vs pixel information
- Identify concrete concept for operational use
  - Support for forecasters for key convective products
  - Decision support



Thank you!  
Questions?  
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